

AMENDMENT UNDER 37 C.F.R. § 1.116
Application No.: 10/541,130

Attorney Docket No.: Q88762

REMARKS

Claim 1 is amended to recite "(c) generating gas bubbles within the premix thereby causing the premix to expand in the formwork." Support for this amendment can be found at, for example, page 3, line 12 of the specification.

Claim 1 is also amended to recite "in step (a) the premix has a viscosity that will permit gas bubbles generated in the premix in step (b) to migrate through the premix, and wherein steps (c), (d) and (e) are performed in order." Support for this amendment can be found at, for example, page 4, lines 16-17 of the specification.

Claims 1 and 30 are amended to recite that "the product has a maximum porosity of from 25 to 60% over a region corresponding to 20 to 80% along the cross-section of the product." Support for this amendment can be found at, for example, page 11, lines 24-26 of the specification.

Claims 1, 7-9, and 18 are amended to improve their form.

Claim 17 is canceled.

No new matter is added. Entry and consideration of the Amendment is respectfully requested.

I. The Claims Satisfy 35 U.S.C. § 112

At page 2 of the Office Action, claims 1-28 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement. Namely, the Examiner asserts that the specification describes the pore size itself varying gradually, but does not state the porosity itself varies gradually away from the outer surface and decreases gradually toward another surface.

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At pages 2-3 of the Office Action, claims 1-30 and 32 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Namely, the Examiner asserts that "gradually" is not explicitly defined in the specification nor the claims and thus it is not clearly understood what is meant by the term "gradually," which the Examiner considers a relative term that varies depending on a references.

Applicant respectfully traverses.

Page 10, line 25 of the specification as originally filed does refer to a gradual change in average pore size. However, page 10, line 26 – page 11, line 4 is clearly discussing porosity. The passage in question reads:

"This means that, along that cross-section, the porosity increases away from an outer surface of the product, peaks at some point within the bulk of the product and decreases towards the outer surface. Such a distribution may be represented by a relatively smooth curve (of distance along cross-section versus porosity). Ideally, the distribution may be smooth and symmetrical, such as that represented by a normal bell-shaped distribution curve, although in practice the distribution curve is likely to be asymmetrical. Thus, the maximum porosity may not actually occur at the mid-point of the relevant cross-section. It is important to note however that the product includes relatively dense outer regions and a relatively less dense inner (or core) region (emphasis added)."

The Examiner has rejected the claims concerning the term "gradually" as used in the claims. The term is simply intended to denote the type of porosity change that is observed and it is not intended to be construed in absolute terms. It is appreciated that the Examiner's rejection probably stems from the relationship between the presently claimed invention and the prior art that has been cited (Jensen). However, as will be explained below, it is believed that the presently claimed invention is distinguished from Jensen in a number of regards and Applicant does not therefore rely on an absolute meaning of the term "gradually" as used in the claims.

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Therefore, solely in order to advance prosecution, the phrase "gradually" to has been removed from claim 1. The rejections are therefore moot.

Reconsideration and withdrawal of the rejections under 35 U.S.C. § 112, first and second paragraphs, are respectfully requested.

II. Claims 1, 3, 6 10-11, 13-17, 26-29, and 32 Are Non-Obvious Over Jensen

At page 3 of the Office Action, claims 1, 3, 6 10-11, 13-17, 26-29, and 32 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over "Jensen" (U.S. Patent Application Publication 2002/0047223).

Regarding claim 1, the Examiner cites Jensen as teaching all the requirements of claim 1, except the Examiner acknowledges that Jensen does not teach that gas bubbles are introduced into the premix to create the pores. However, the Examiner concludes that where both processes add pores through the addition of bubbles to the premix and achieve the same desired result of a porous cementitious product, it would have been obvious to one of ordinary skill in the art to generate gas bubbles after casting because the court has held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results.

Applicant respectfully traverses.

Jensen describes a process for preparing light-weight concrete blocks in which a slurry is poured into a mold. Importantly, it should be noted that the slurry is pre-foamed before being introduced in the mold. There is no disclosure in Jensen of foaming the slurry after it has been introduced into the mold. The Examiner believes that it will be obvious to vary the order in which the slurry used Jensen is foamed. However, Applicant disagrees.

According to MPEP § 2413.01(V and VI), if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose or would change the

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principle of operation of the prior art being modified, then the teachings of the reference are not sufficient to render the claims obvious.

It is a fundamental requirement of Jensen that the slurry be pre-foamed such that generation of gas bubbles in the slurry after it has been introduced into the mold is completely inconsistent with the approach being taught by Jensen. Thus, in relation to this point, it is necessary to consider foaming of the slurry in the context of the overall methodology that is being taught by Jensen.

In this regard, it should be noted that according to paragraph [0014] of Jensen a particular aim is to provide a method for forming individual building units having substantially uniform dimensions and relatively consistent densities for each building unit produced. To this end, it is important, according to Jensen, to prepare individually mixed batches of slurry in order to control the properties, such as the density, of each building unit formed (see paragraph [0022]).

Paragraphs [0027] and [0028] also go to this point and it is evident that production of a pre-foamed slurry having consistent characteristics (as between individual batches) is a very important aspect of the invention taught in Jensen. Here, it is important to note in particular the first sentence of paragraph [0028] that *"One of the difficulties known in the art has been the inability to form batches of cementitious slurry with relatively consistent characteristics (i.e., density, even dispersion of aeration, quantities of ingredients, etc.)"*. According to the methodology of Jensen these problems are solved by using weighted amounts of dry ingredients and metered amounts of liquid ingredients to obtain relatively consistent quantities of ingredients in each batch.

It is believed to be clear from these teachings that it is essential according to Jensen to undertake pre-foaming of the slurry before the slurry is introduced into a mold. Again, the

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fundamental requirement of Jensen is that batches of slurry have consistent characteristics, notably density and even dispersion of aeration. It is therefore submitted that a person of ordinary in the art would not regard it as obvious to depart from the methodology of Jensen with respect to foaming of the slurry that is used.

It is also important to note that, according to Jensen, particular steps are taken to ensure that the slurry is fully foamed before being introduced to the mold. Thus, paragraph [0029] talks about using a temperature dependent foaming and mixing the slurry at a temperature that will give maximum foaming efficiency.

Once formed, according to Jensen the foamed slurry is introduced into a heated mold and the intention is to locally destabilize the foam at the interface between the mold and the slurry to create a hardened shell around each building unit produced. It should also be noted that paragraph [0030] couples maximized foaming efficiency of the foaming agent in the slurry and quicker curing of the cement slurry and outer formation of an outer shell by the addition of heat.

Jensen also specifically teaches pouring the (heated) slurry into a heated mold and it is evident that these two features are intended to have a particular effect. Thus, it is stated according to paragraph [0032]:

"The use of the heated cementitious slurry in conjunction with the aid of the heated mold quickly cures the slurry such that the entrained air cells are prevented from coalescing, interconnecting, or migrating. Thus, the air cells remain evenly dispersed throughout the slurry. The hardened outer shell produced by the heated mold produces a dense outer layer that reduces the ability of the cement to draw in water by capillary action" (emphasis added).

It is clear from this excerpt that Jensen is teaching a method in which a pre-foamed slurry, having uniform aeration, is introduced into a heated mold with the intention that air cells in contact with the surface of the mold will collapse and with the intention of retaining the

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original aeration within the bulk of the slurry. Note that paragraph [0032] specifically talks about preventing coalescing, interconnecting or migration of air cells and that the air cells remain evenly dispersed throughout the slurry.

Paragraph [0080] reinforces this point as it talks about hastening "*hardening of the slurry to limit the amount of coalescing of adjacent air cells within the slurry and to limit the amount of migration of air cells and settling of heavier particles of the mold during the curing process*". It is also noted that the:

"elevated temperature of the slurry and mold quickly reduces the viscosity of the slurry to a point below which the air bubbles in the slurry can move or coalesce to form larger bubbles. Indeed, in accordance with the present invention, the heated ingredients utilised to form the cementitious slurry nearly immediately being to cure much more rapidly".

It is also important to note that paragraph [0081] indicates that heating the mold to a temperature above the critical temperature of the foam produces an outer wall or shell in each block. This shell is produced because the foam breaks down (i.e., the air cell collapses) in the layer adjacent the mold that exceeds the critical temperature of the foam before the slurry in this outer layer cures. One consequence of the heated mold "*is the formation of larger air cells adjacent the outer layer. The air cells in this region may not reach a hot enough temperature before curing of the cement to break down but may coalesce to form a small layer of larger air cells between the outer layer and core of the block*".

With respect to the structure of the product that is obtained according to Jensen, paragraph [0086] talks about a block having a relatively smooth, dense, continuous outer surface and a light weight inner core. Note though what is acknowledged at paragraph [0081].

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It may also be noted that paragraph [0083] of Jensen talks about compression of a slurry, but it would be noted that the slurry would otherwise be of fixed volume. The slurry is pre-foamed before being poured into a mold.

In contrast, the methodology of the present invention as claimed is fundamentally different from that taught in Jensen. Firstly, it should be noted that in the presently claimed invention it is a requirement that gas bubbles are generated within a cementitious premix after the premix has been cast in a formwork (mold). It should also be noted that generation of gas bubbles after casting causes the premix to expand in the formwork. This is a fundamentally different approach from that taught in Jensen where the slurry that is used must be fully foamed before being introduced into a mold.

It is also a requirement of the method of the presently claimed invention that expansion of the premix in the formwork is controlled by confinement of the premix and by causing gas bubbles at outer surfaces of the premix to collapse to produce dense outer regions. These requirements are neither taught nor suggested in Jensen since in Jensen, after casting of the slurry into a mold, there is no expansion of the slurry.

In accordance with the presently claimed invention, it is also a requirement that the viscosity of the premix that is used permits gas bubbles generated in the premix to migrate through the premix. Migration of gas bubbles in this way is an important element in achieving the porosity profile in the presently claimed invention. In complete contrast, it is a stated requirement in Jensen that coalescing, interconnecting or migrating of air cells is prevented.

Thus, Jensen is a static process in this respect, where efforts are made to lock in the structure of the pre-foamed product to achieve uniform density and aeration within the bulk of

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the product. In contrast, the method of the presently claimed invention is a dynamic process in which, after casting, the slurry matrix expands and in which bubble migration is required.

It is also a requirement of claim 1 as amended that the cementitious product that is produced has a particular porosity profile. Thus, the product has a maximum porosity of from 25 to 60% over a region corresponding to 20 to 80% along the (relevant) cross-section of the product. The products taught by Jensen would not and could not have this particular porosity characteristic. Indeed, the porosity profile taught in Jensen is one in which the product has a high density outer skin with the bulk of the product being of uniform characteristic. Here it should be noted that paragraph [0032] of Jensen talks about preventing coalescing, interconnecting or migrating of air cells with the result that the air cells remain evenly dispersed throughout the slurry.

It is also relevant to note what is acknowledged at paragraph [0081] of Jensen. According to this paragraph it seems that the product structure will include a dense outer wall (shell), a small layer of larger air cells (i.e., lower density) and then (noting what is acknowledged at paragraph [0032]) an even distribution within the bulk of the product. In other words, the methodology of Jensen produces a product with a dense outer wall, a region of lower density adjacent the outer wall and then a uniform distribution of porosity across the bulk of the product. Clearly this is a fundamentally different porosity profile than required in the claims of the present application.

Thus, it is submitted that the method of claim 1 would not be obvious given the disclosure of Jensen.

As claim 1 is believed to patentable in view of Jensen, it is also believed that claims dependent on claim 1 are patentable over Jensen.

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Nevertheless, Applicant disagrees with the Examiner's analysis in relation to the dependent claims specifically discussed in the Office Action, as discussed below.

With respect to claim 3, the Examiner's comments do not seem to take into account that in the presently claimed invention the premix is expanding whereas in Jensen the premix is static.

With regard to claim 6, the Examiner's comments do not seem to have taken into account the fact that it is a stated requirement according to Jensen that coalescing, interconnecting or migration of air cells is to be prevented. Vibration of the formwork, as per claim 6, is likely to promote some form of bubble coalescence and/or migration.

With respect to claims 10 and 11, Jensen discusses forming a pre-foamed slurry before introduction of the slurry into the mold. Jensen is not concerned whatsoever with formation of gas bubbles within the slurry after introduction into the mold.

With respect to claim 13, it should be noted that this talks about gas bubbles being created in the premix being retained. Jensen does not generate gas bubbles in the slurry after introduction into the mold.

With respect to claim 14, Jensen does not teach the use of an expanding slurry. In Jensen the slurry is a pre-foamed, static slurry.

With respect to claim 15, there is no discussion whatsoever in Jensen of varying product characteristics as required. With respect to claim 16, there is no discussion in Jensen of cutting, trowling or screeding the surface of the premix.

Claim 17 is canceled.

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With respect to claim 26, the Examiner's comments are noted. However, it should also be noted that Jensen describes formation of a particular form of product. There is no disclosure or suggestion of forming flat slabs, wall panels, roofing tiles and the like.

With respect to claim 28, there is no disclosure or suggestion in Jensen of controlling product characteristics by varying the degree of confinement of the product as it expands. Jensen describes using a pre-foamed slurry and, there is no disclosure of generating gas bubbles in the slurry after it has been introduced into a mold.

With respect to claim 32, Jensen does not disclose the use of an expanding premix.

In view of the above, Applicant respectfully submits that claim 1 and claims dependent thereon are non-obvious over Jensen. Reconsideration and withdrawal of the § 103 obviousness rejection are respectfully requested.

III. Claims 4 and 16 Are Non-Obvious Over Jensen In View of Hansen

At page 8 of the Office Action, claims 4 and 16 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Jensen as applied to claim 1 above and further in view of "Hansen" (U.S. Patent No. 5,039,249), for reasons of record.

Claims 4 and 16 depend directly from claim 1. As noted above in section II, claim 1 is not rendered obvious by Jansen and Hansen does not appear to make up for the deficiencies of Jansen. Namely, it is a fundamental requirement of Jensen that the slurry if pre-foamed before being introduced into a mold. It is also a requirement that the methodology of Jensen prevent coalescence, interconnection or migration of air cells. Thus, Jensen does not teach expanding of a premix, as is a requirement of claim 4. The Examiner's comments in relation to the teaching of Hansen are noted. However, given the disclosure of Jensen, Hansen is not believed to be capable of rendering the presently claimed invention obvious.

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Reconsideration and withdrawal of the § 103 obviousness rejection based on Jensen in view of Hansen are respectfully requested.

IV. Claims 2, 5, 12, 18-23 and 25 Are Non-Obvious Over Jensen In View of Shi

At page 8 of the Office Action, claims 2, 5, 12, 18-23 and 25 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Jensen in view of "Shi" (U.S. Patent Application Publication 2002/0117086), for reasons of record.

claims 2, 5, 12, 18-23 and 25 all depend from claim 1, either directly or indirectly, and are thus non-obvious over Jensen as discussed above in section II.

Shi apparently teaches various techniques by which gas bubbles may be introduced into a slurry/premix. However, according to Jensen it is a requirement that gas bubbles be generated in the slurry before introduction of the slurry into a mold. Therefore, even a skilled person were to combine the specific gassing techniques taught in Shi with the methodology taught by Jensen, *arguendo*, this would still not lead to the presently claimed invention since formation of a pre-foamed slurry would still take place. As explained above in section II, Jensen requires pre-foaming before introduction into a mold. Generation of gas bubbles after introduction into a mold is inconsistent with the spirit and intent of Jensen.

Reconsideration and withdrawal of the § 103 obviousness rejection based on Jensen in view of Shi are respectfully requested

V. Claims 7-9 Are Non-Obvious Over Jensen In View of Kovacs

Claims 7-9 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Jensen as applied to claim 1 above, and further in view of Kovacs (WO 98/42637), for reasons for record.

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Claims 7-9 depend directly from claim 1, either directly or indirectly. Thus, these claims are non-obvious over Jensen as discussed above in section II. Further, Kovacs does not appear to make up for these deficiencies. Kovacs may teach a particular methodology for introducing gas bubbles into a slurry. However, it is a fundamental requirement of Jensen that the slurry is pre-foamed before being introduced into a mold. The combination of the cited documents may therefore lead to application of the gassing technique taught in Kovacs in a methodology in which a slurry is pre-foamed before being introduced into a mold. However, the combination is not one that would lead to a process in which foaming takes place after the slurry has been introduced into a mold. The rejection is completely inconsistent with the approach required by Jensen.

Thus, claims 7-9 are non-obvious over Jensen in view of Kovacs. Reconsideration and withdrawal of the § 103 obviousness rejection are respectfully requested.

VI. Claim 24 Is Non-Obvious Over Jensen In View Of Ainsley

At page 12 of the Office Action, claim 24 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Jensen in view of "Ainsley" (U.S. Patent No. 5,587,012).

Claim 24 depends directly from claim 1 and is non-obvious over Jensen for the reasons stated in section II. Further, Ainsley does not appear to make up for the deficiencies of Ainsley. Namely, even if these references were combined, the resultant methodology would be one in which the teaching of Jensen prevails with respect to formation of a pre-foamed slurry before introducing the slurry into a mold.

Thus, claim 24 is non-obvious over Jensen in view of Ainsley. Reconsideration and withdrawal of the § 103 obviousness rejection are respectfully requested.

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Under the circumstances, it is believed that the present invention as claimed is suitably distinguished over the teaching of Jensen. In particular, it is believed that the presently claimed invention requires particular method steps that would not be obvious from Jensen, either alone or in combination with any of the references cited by the Examiner. It is also believed that the methodology of the presently claimed invention leads to products having a structure (porosity profile) that is different from that which would result from the methodology taught by Jensen.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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